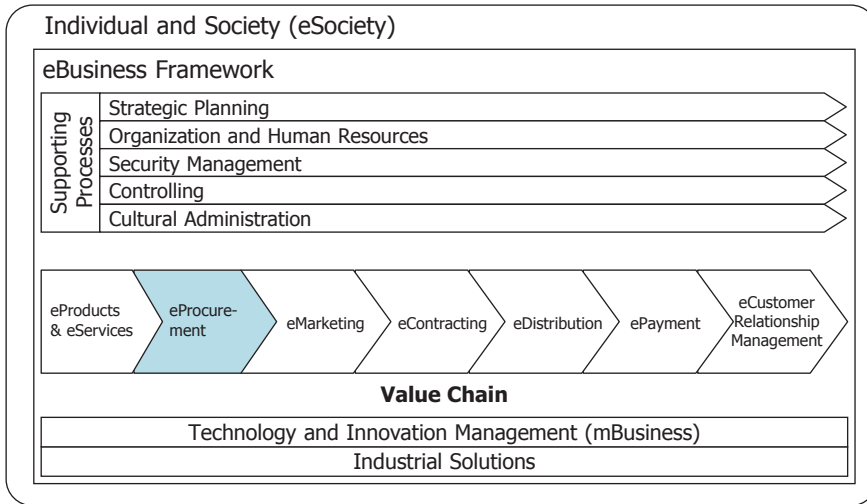


3 eProcurement



This chapter deals with the fundamental market models for eProcurement solutions and illustrates catalog management. Section 3.1 is dedicated to strategic and operational electronic procurement processes. Apart from direct goods, information systems must also support the procurement of MRO goods (Sect. 3.2). Product catalogs and services are used in the selection and procurement of products on the customer side, the supplier side, or in marketplaces; these three basic eProcurement solutions are characterized in Sect. 3.3. Section 3.4 describes multi-supplier catalogs and their mode of operation in view of the SPSC standard. Software systems and service categories for desktop purchasing are presented in Sect. 3.5. Section 3.6 illustrates the market for eProcurement service providers. Literary references are given in Sect. 3.7.

3.1 Strategic and Operational Procurement

The terms procurement and purchasing are often mixed up, and sometimes treated as the same thing. However, it is important to draw some distinctions between them. A procurement process is divided into six substeps:

Substeps in procurement

- 1. Standardizing and specifying the procurement
- 2. Selecting the supplies for products and services
- 3. Carrying out contract negotiations
- 4. Ordering the products and services
- 5. Supervising the delivery
- 6. Subscribing to additional services

The tasks described above can be divided within a company into strategic, tactical, and operational subtasks according to Fig. 3.1. The strategic level involves standardization of the procurement, deciding whether to make or buy, as well as control. Analyses of demand patterns and ordering patterns or negotiations of general contracts are found on the tactical level. The operational level is however responsible for advertising, deciding on offers, as well as ordering, supervising, and purchasing associated services.

Explaining the term eProcurement

eProcurement refers to all of the connective processes between companies and suppliers that are enabled by electronic communication networks. eProcurement includes strategic, tactical, as well as operational elements of the procurement process.

Operational, administrative, and market-oriented activities are combined with ePurchasing whenever these include electronic aid. ePurchasing is just one part of eProcurement; it refers to the technical transaction elements of the purchase.

From the point of view of the company, the products and services to be procured can be classified in different ways. Direct goods are commodities or provisions which flow directly into the manufacturing activity. Also included are raw materials and resources, which directly provide basic materials for the product.

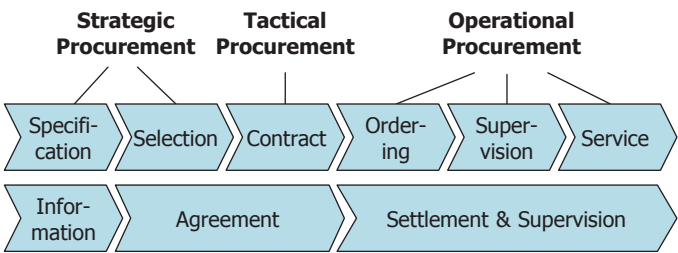


Fig. 3.1: Steps in the procurement process

Indirect goods are products and services that are used to run the company. They do not go into the end product. They are often termed “MRO goods” (maintenance, repair, operations). These include fuels required for the production process, like energy. Utility goods and tangible assets needed for the production of the finished product are also included here.

Procurement of direct goods

According to data from industrial companies, an average of up to 80% of all purchase transactions originate with the procurement of MRO goods. If the tangible assets are also included in the indirect services, then these create an average of approximately one-third of the total external costs in companies. Aside from the costs of direct services and personnel, MRO services represent the largest cost block for a company. Because of this, eProcurement—the efficient procurement of goods via communication networks—becomes very important.

Meaning of indirect and MRO goods

3.2 Information Support for Procurement

ERP (enterprise resource planning) systems are used for the information–technical support of procurement in companies; in the past, the terms MRP (material resource planning) or rather MRP II (manufacturing resource planning) were used instead of ERP. Apart from procurement, these systems also support other areas of operation in the company, such as financial accounting, production, sales, or customer relationship management. A wide range of ERP systems are available, because with standard software it is possible to circumvent the separate development of information systems. Examples of standard software products for ERP are SAP R/3, Peoplesoft, OneWorld, Oracle, and Baan.

Use of ERP systems

The focus of so-called ERP systems is the procurement of direct products. The systems are optimized for this type of product. Indirect or MRO products are supported to a degree by ERP systems.

Focus of ERP systems

The most important characteristics of direct and indirect goods procurement are compared in Fig. 3.2. Procurement process organization and information–technical support must be carried out differently for these product classes.

Procurement of direct goods (Material Requirements Planning)	Procurement of indirect goods (Maintenance, Repair and Operations Planning)
Scheduling	No scheduling
Defined material for production	Different fuels for operation
Specially manufactured material	Utility goods and tangible assets
Procurement requirements of experts	Consumers are in principle all employees
No approval necessary	Partial approval necessary
Elimination of unit listing	Catalog purchasing

Fig. 3.2: Comparing the procurement of direct and indirect goods

*Just-in-time
manufacturing*

The quality, availability, and prices of direct goods are of great importance for the company. Accordingly, a great deal of attention is given to the selection and maintenance of the supplier relationship. To reduce tied-up capital, the principle of just-in-time procurement is often used. Prerequisites for using this approach are a good ability to plan for need, delivery date reliability, and supplier flexibility. The best case is when the company obtains an unstored supply of the material from the supplier chain.

*Planning is
made more
difficult with
MRO goods*

The procurement of indirect goods can only be planned ahead in very few cases. Since in principle all of the employees in a company are consumers, the procurement process becomes costly. A now and then type of procurement is used with goods that are not time critical. An example of this is a workstation setup that includes a personal computer. It is possible that the stock procurement process for low-value goods or for goods in general involves long delivery periods. Office material falls into this category; further examples of MRO goods and services are listed in Fig. 3.13.

According to Dolmetsch, the following problem areas can arise during the procurement of indirect MRO goods:

*On high
process costs
with MRO
goods*

- Purchasing expends too much time and routine administrative work on the procurement of indirect goods instead of accomplishing tasks with a higher creation of value. Lack of automation, manual clarification, and the need to obtain approval have negative effects on process costs. Are the two-way checks (verifying the invoice against the order) or three-way checks (verifying the invoice against the delivery note and against the order) commonly used for direct goods also worth applying for indirect MRO goods when the commodity value is frequently lower than the process costs?

*Bypassing
purchasing*

- Due to the overburdening of purchasing departments and long procurement times, maverick buying flourishes. Maverick buying is the procurement of MRO goods by circumventing the purchasing department, such as the procurement of office material at the stationery shop around the corner. According to a survey by Intersearch, companies pay on average 16% more when purchasing non-negotiated products. Long delivery times result in a building up of stock reserves in the workplace or in small storage; this in turn leads to greater capital commitment.

*Problems with
printed catalogs
and manual
orders*

- For products with short life cycles and dynamic price structuring, printed catalogs are not suitable for ordering. The purchase planning manager must inquire about the price each time, thus resulting in additional expenditure.
- Orders carried out manually and individually frequently cause wrong deliveries and delays.
- Due to the lack of automation of repetitive purchases (e.g., using a complete office workstation), the potential to save costs is thrown away.

It is clear from the above explanations that the procurement process for MRO goods presents a double challenge: on the one hand, the procurement process

for indirect MRO goods should be optimally structured; on the other hand, the opportunities presented by information and communication technologies must be utilized.

3.3 Basic Types of eProcurement Solutions

3.3.1 Market Models for eProcurement

In practice, different models for electronic procurement have developed according to who controls the marketplace. There are platforms controlled by the provider (sell side) or by the consumer (buy side), as well as those controlled by market organizations which in turn are provided and controlled by a neutral third-party authority. Figure 3.3 gives an overview of the three market models.

In the sell-side market model, the supplier provides the purchase software and an electronic catalog. Here the buyer must register with each supplier and familiarize himself with different software solutions and navigational aids. Some suppliers with sell-side solutions provide extensive functions for personalization, for product configuration, or for compatibility testing. Thus the buyers can establish rules for the individual customer in the procurement process.

*Three
fundamental
market models
for
eProcurement*

*Sell-side
market model*

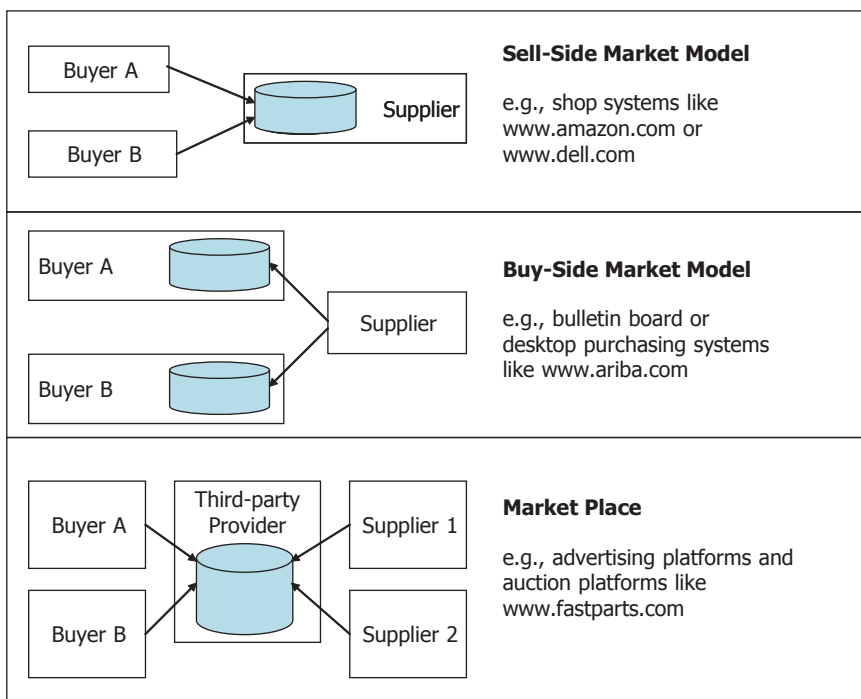


Fig. 3.3: Three fundamental market models for eProcurement

Many eShops used in B2B businesses are based on the sell-side market model. One example is Amazon, which can be thought of as a supplier of information (books and other articles). Another example is Dell, which supplies computers and peripheral devices.

*Buy-side
market model*

In the buy-side market model, the buyer must run and maintain the appropriate software together with extracts from the product catalog. Some self-defined catalogs consolidate articles from different suppliers into a multisupplier catalog. Use within a company increases, since the procurement can be realized with a uniform product view. Moreover, procurement process rules like observance of contract conditions, authority when ordering, or procedures for approval can be realized for the individual customer, but with corresponding expenditure. At any rate, the procurement process remains largely supplier independent and the process data obtained can be collected and analyzed.

*Software for
desktop
purchasing*

Both bulletin boards and so-called desktop purchasing systems (DPSs) are software solutions that support the buy-side market model. The provider Ariba is well known in this arena, and its solution is more closely detailed in Sect. 3.5. Furthermore, the company can outsource its procurement logistics and collaborate with an eProcurement service provider (see Sect. 3.6).

*Marketplace
for
eProcurement*

In the electronic marketplace for eProcurement, the required software solutions and the catalogs are operated by a third-party provider. This platform is used simultaneously by several companies (buyers) as well as by several suppliers. The third-party provider can uniformly display and describe the products with his software solution. Perhaps he provides supplier-wide valuation criteria and the opportunity to perform comparisons in order to obtain added value over the sell-side and buy-side market models. One such marketplace is the auction platform Fastparts (<http://www.fastparts.com>), which deals with standardized electronic components.

Bilateral sales relationships and procurement relationships are, as a rule, created on an individual basis between the demanding and supplying companies. Such relationships are closed to outsiders. Frequently, general contracts or volume contracts are concluded from the formation of the relationship.

As expected, the purchasing usually takes place on the web site of the suppliers (sell side); the buy-side market model is only worthwhile with larger companies or concerns. Electronic marketplaces (auctions, stock exchanges) have also gradually developed and, according to estimates, already cover a quarter of the eProcurement market volume.

*Focusing on
industries*

Electronic marketplaces frequently differ according to whether they are vertical or horizontal. Vertical marketplaces focus on specialization or on an industrial solution. One such well-known platform is ChemicalConnect (<http://www.ChemConnect.com>), which is used for procurement in the chemical industry. Another example, originally put together for the three large American automobile manufacturers Daimler-Chrysler, Ford, and General Motors, operates under the name ANX (<http://www.anx.com>). ANX developed into an exchange platform for automobile manufacturers, aviation, transport, and logistics.

Horizontal marketplaces, in contrast to the vertical ones, do not have an industrial focus. A well-known representative is Thomas Register (<http://www.thomasregister.com>), a platform for the procurement of software in industry and also for ordering mechanical and electromechanical component parts.

According to a market study in Switzerland on the use of eProcurement, general goods such as books and magazines (51%) and computer and office supplies (47%) are bought online. Less than a fifth of all companies buy raw materials over the Internet. When one considers companies from the production sector, this proportion rises to 32%. It is interesting that almost a third of all companies book business trips (flights, overnight accommodation, car rentals) online. Thus, as well as physical products, services are increasingly being bought over the Internet too. Today's companies are prepared to procure more complex services and products over the Internet.

Backlog of demand for eProcurement

3.3.2 Sell-Side Model

eProcurement based on the sell-side approach requires the supplier to provide the entire business logic for the procurement process, including the product catalog in an information system (purchasing software, eShop).

The most important software modules and functions on the supplier side are listed in Fig. 3.4. The user profile of the buyer, as well as his rights and obligations (login, authorization, purchasing limits, cost center assignment, among other things) must be recorded and maintained by the supplier software. If the buyer uses several suppliers with sell-side systems, a high work and maintenance expenditure arises.

Storing the user profile

The supplier performs content management of the electronic catalog entries. He maintains the product description and classification and specifies the changing

Content management for catalogs

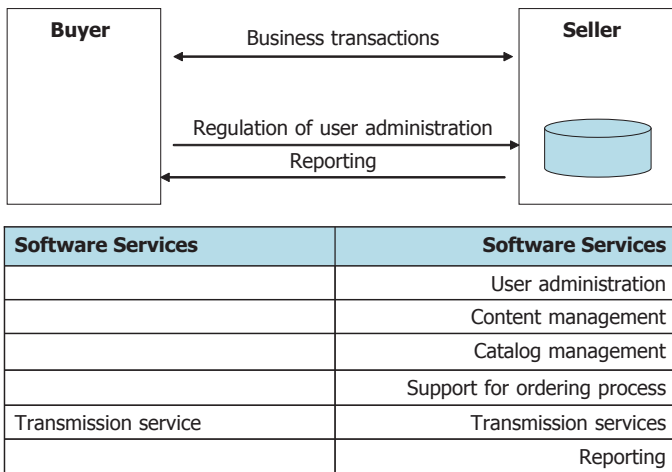


Fig. 3.4: Electronic procurement (sell-side model) (according to Schubert)

workflow. Ordering processes and settlement processes are likewise supported by software. Search mechanisms for articles and services enable the preparation of a basket of goods as well as the acquisition of orders and commissions. Invoicing takes place with the help of ePayment solutions (see Chap. 7). Depending upon the operational status of the supplier software, various reports on the buying behavior and the purchasing of products and services are requested.

*Coordinating
an eShop with
the ERP
system*

An eShop is a classical variant of procurement based on the sell-side principle. It supports the information, agreement, and fulfillment phases with online orders. Such a system facilitates integration with the ERP system of the supplier, depending upon the stage of development. The system can then supply additional information such as stock, availability, or prices for the individual customer. The repeated issuing of orders to the supplier’s ERP system is unnecessary. Depending upon the operational status of the eShop, the buyer can specify complex products using a configurator. For the supplier, this means automation of consultancy services, a reduction of acquisition expenditure, and the possibility of delegating responsibilities to the procuring company.

*Need for
change
management*

It is obvious that a relationship between the procuring company (buyer) and the supplier must be developed in order to successfully operate a sell-side variant. In particular, the shop system also requires information on the organization of the procuring company. At the same time, changes must be suitably organized. The company is confronted with a multitude of information systems as soon as it procures products with several suppliers. This requires considerably more information and training.

*Integration
into existing
infrastructure*

Figure 3.5 summarizes the most important advantages and disadvantages of sell-side solutions.

One problem area is the integration of the procurement process into the buyer’s information system. A possible solution to this, as offered by Dell USA for its large customers, is the cXML standard (XML specification for catalog formats, see Sect. 3.4). Electronic orders can be sent over the Internet using cXML. The otherwise open cycle is thus closed.

Advantages	Disadvantages
<ul style="list-style-type: none">• Configuration of complex products possible• No capital outlays for an ordering system• Operating costs for maintenance of current product lists and prices do not apply• Short delivery times through direct input of the order into the supplier’s system• Can query current availability and prices	<ul style="list-style-type: none">• No possibility of automatic product comparisons• Limited support of the procurement process with the buyer• Consumer or requesting customer must use a different information system for each provider• Limited integration of the procurement process into the operational information systems of the customer

Fig. 3.5: Advantages and disadvantages of sell-side solutions

3.3.3 Buy-Side Model

The buy-side option in eProcurement requires the company (the buyer side) to install and maintain the purchasing software, including the product catalog. The supplier is only responsible for the content management, and regularly transmits changes in the product catalog.

Here, as shown in Fig. 3.6, most eProcurement services run on the company side. In particular, user management (with the administration of authorization and access rights) is conducted by the company. The steps in the ordering process with company-specific characteristics (licensing procedure, workflow control, etc.) are likewise determined by the company. The product catalog can be enlarged with offers from additional suppliers and expanded into a purchasing catalog for all MRO goods. In this way, although the company may incur administration and maintenance expenditure, a company-specific solution for eProcurement is achieved. Integration into existing software environments and connections to ERP systems are easier to manage. Figure 3.7 summarizes the most important advantages and disadvantages of buy-side solutions.

Procurement applications that are operated by the company are called desktop purchasing systems. They are established at the workplaces of both the consumer and the solicitor and are aligned with the procuring company’s process. They offer a uniform user interface, can take into account company-specific standards, and are usually well integrated into the operational information systems of the company. One prerequisite to the successful operation of such a system is the maintenance of a catalog of the products that can be ordered and negotiated with the suppliers. This catalog is often called the “multisourcing product catalog” because it contains product data from different suppliers.

DPSs on the user side are mostly laid out as web applications. They support all of the positions within the company involved with procurement. Thus, the

Buy-side solution

Administration expenditure for user management

Desktop purchasing with a multisupplier catalog

Desktop purchasing as an integration platform

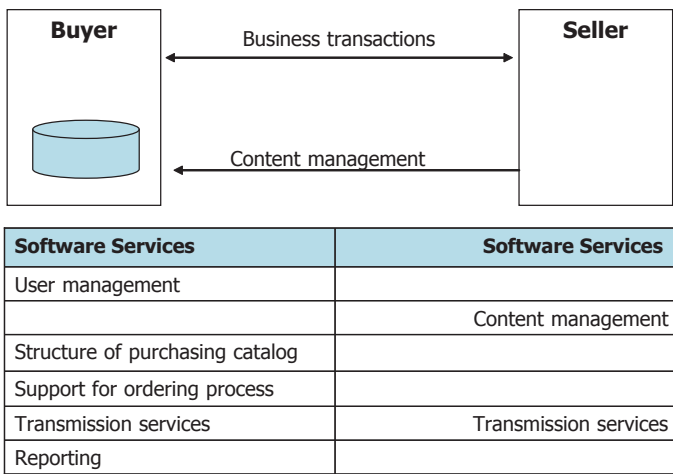


Fig. 3.6: Electronic procurement (buy-side model) (according to Schubert)

Advantages	Disadvantages
<ul style="list-style-type: none">• Procurement process can be organized in a company-specific manner• Internal authorization and licensing procedures are well supported• Process turn around times can be reduced• Stocks can be kept small• Central administration produced by negotiated products• Elimination of maverick shopping• Consumer/solicitor can operate system themselves• System with uniform menu prompting	<ul style="list-style-type: none">• Complex products are not usually supported• Advertisements are not planned• Capital outlays for information systems are with the procuring company• Operating costs for content management are to be supplied• Not all suppliers have an electronic product catalog• Suppliers sometimes provide poor-quality product data• Coordination of the exchange format must be achieved by the procurer and supplier

Fig. 3.7: Advantages and disadvantages of buy-side solutions

consumer can deposit his purchase order request over the intranet, the cost center manager can grant approval, the buyer can order the product, the consignee can confirm the supply, and the accounts department can pay the invoice. The depth of integration with the supplier determines the extent to which products can be procured without additional interaction and whether the invoice should be delivered electronically to the customer by the supplier.

3.3.4 Marketplace

Range of tasks
of an
infomediary

When the marketplace option is employed in eProcurement, the platform is operated by an intermediary. This intermediary (often called an infomediary or information broker when digital products are involved) has the task of bundling information (products) and making it available on the platform. The intermediary consolidates the offers from the providers and supplies comparable product offers to the consumers. He creates contact between providers and consumers and also carries out procurement transactions in the name of the company (the buyer side) according to demand.

In Chap. 2, it was pointed out that the Internet often eliminates intermediate trade (disintermediation), with providers and consumers meeting directly. So why do intermediaries and infomediaries develop and offer their services in this case? There are three main reasons:

Comparability
of products

1. Since the Internet is based on an open standard, the number of rules that must be followed is kept as low as possible. This leads to a multitude of solutions that are all based on Internet technology but are not uniform between each other. This makes it difficult for procuring companies to compare products (price, quality, availability). Thus, the intermediary undertakes this service and can be paid for it.

- 2. The second argument is the association of supply and demand. Empirical studies show that a lot of time is spent searching for suitable providers and consumers. An intermediary can unite a multitude of providers and procuring companies on his platform and thus considerably reduce the search expenditures of the market participants.
- 3. Thirdly, there is the issue of location independence. The depersonalization associated with this conceals the risk of the business transaction for the procuring company. A successful transaction is assured by the intermediary, who can be compensated for doing this. On request, the intermediary carries out the business transactions while preserving anonymity.

Saving time with eProcurement

Preserving anonymity

Various forms of intermediary platform used for procurement exist. They range from trade books (Yellow Pages), advertisement platforms, and auctions to industry-specific platforms. A multitude of price models are also used by the platform operators.

The software services of an intermediary in the procurement process (buyer side) and in offer representation (supplier side) are shown in Fig. 3.8. The platform operator tries to achieve an added value for the procuring company using his own software services; in other words, by providing offer representations and offer comparisons. The suppliers regularly transmit their product catalogs and remain responsible for the content management of their offers.

Software service for the procurement process

Therefore, that the work of the intermediary essentially consists of providing high-quality information to both providers and consumers and guaranteeing the smooth execution of business transactions. Previous experience with such platform providers has shown that intermediaries can only achieve the demanded

Specialized infomediaries become accepted

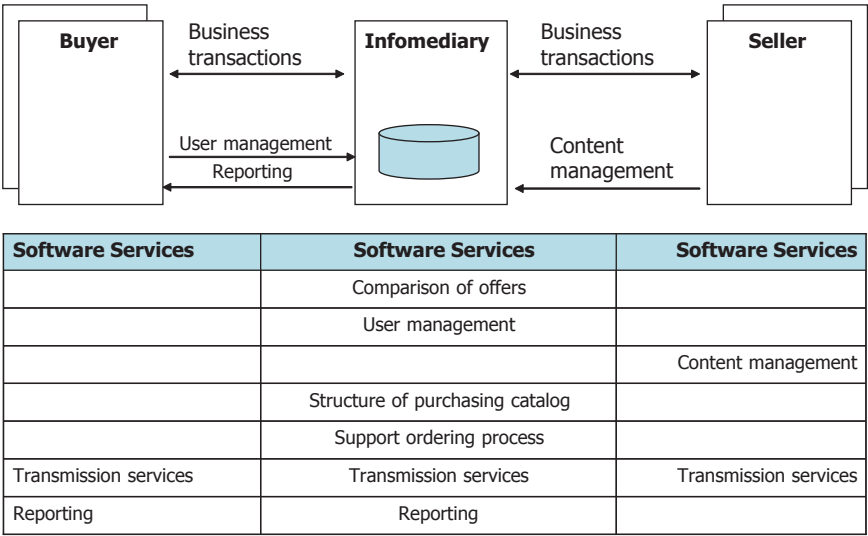


Fig. 3.8: Software services of an intermediary in eProcurement

Advantages	Disadvantages
<ul style="list-style-type: none">• Reduction of search time• Representation of current and detailed market offerings• Efficient transactions• Comparability of different offers• Anonymous procurement opportunity• Bundling of supply and demand in order to achieve better conditions	<ul style="list-style-type: none">• Lacking integration into the ERP systems of the procuring company• Intermediaries usually cover only a narrow product range in sufficient depth• Frequently a large company can negotiate directly with the provider/manufacturer for better prices• Classified directories are frequently not upto-date

Fig. 3.9: Advantages and disadvantages of marketplaces

quality and liquidity with sufficient specialization. This also explains the greater overall success of vertically organized intermediaries compared to horizontally established platform operators.

Contribution to the efficiency of electronic markets

Figure 3.9 summarizes the most important advantages and disadvantages of marketplaces: unlike the sell-side and buy-side solutions, comparisons between different providers are made possible by intermediaries. The bringing together of several providers increases the liquidity of the market and ideally results in efficient markets, even in regard to price fixing. Depending upon the needs of the providers and consumers, the anonymity of market participants can be guaranteed when products and services are requested.

3.4 Catalog Management

Display of product information

Catalog management makes functions available for the construction, maintenance, and use of product data. Information on products and ranges must take place according to certain selection and inquiry criteria, supplemented by detailed data on material, quality, price, etc. If possible, the product catalog should be adapted to the wishes of the consumer (ordering company).

The need for a multisupplier catalog

All three solution variants presented above (sell-side, buy-side, and marketplace models) require the maintenance of a product catalog. In the buy-side and marketplace models, this catalog must combine the product data from several suppliers (multisupplier catalog or multisourcing product catalog, MSPC). It should contain all of the products along with their specifications and their suppliers and customers.

Problem areas in catalog management

However, a number of problems arise when attempting to realize a multisupplier catalog:

- Providers, intermediaries, and consumers have different ideas about the catalog format
- Classification criteria for products and services vary among the market participants

- The products must be described distinctively and illustrated in detail
- The data quality differs between procuring companies
- Individual prices are arranged between the contracting parties

Providers of buy-side solutions must overlook the fact that the procuring companies have individual product catalogs and instead make sure that the companies periodically update their electronic product catalogs. The provider can achieve this using suitable content management. The operators of marketplaces essentially perform the same tasks as the providers of buy-side solutions. The information must also be optimized for review by a multitude of customers that possibly have different requirements regarding the catalog, the degree of detail, and the prices.

Different catalogs can be brought together if they have a uniform meta-structure. This facilitates hierarchical searches through product hierarchies and enables different providers.

One metastructure that is suitable for a horizontal marketplace and covers both products and services is the Standard Product and Service Code (SPSC) from Dun & Bradstreet (also see the current development of the United Nations standards derived from the SPSC on the web site <http://www.unspsc.org>). The SPSC is a classification scheme which leads to a well-defined classification of goods and services. It was first published in 1996, and is now used by American Express, Mastercard and Visa, among others.

The SPSC is a hierarchical set of numbers involving five standard classification levels. Each classification number consists of ten digits which, if required, can be supplemented by an additional two digits. These ten digits are divided into three-, four-, six-, eight-, and ten-digit groups which gradually specify the item in question. Figure 3.10 shows an example of the use of SPSC numbers.

SPSC standard

Hierarchical structure of the SPSC

SPSC Number	Description
511	Paper and office supplies
5112	... Office supplies
5112 04	... Computer and copier supplies
5112 04 05	... Printing supplies
5112 04 05 01	... Toner cartridges

Fig. 3.10: Example showing some Standard Product and Service Code (SPSC) numbers

The SPSC is used foremost in applications which require the identification and classification of goods. The service spectrum of the supplier is included. In addition, an entry can be made into electronic catalogs with information systems as well as with data warehousing such as during the evaluation by item class and degree of detail given.

SPSC number system

In order to describe products in even greater detail, the ten-digit SPSC number system can be extended by two digits. Digits 11 and 12 represent services associated with the product. Typical services are repairing (91), servicing (92), leasing (93), or renting (94).

Industry-wide use

The SPSC system is regarded as stable due to the relatively restricted level of detail employed. If the level of detail was higher, the information in the system would have to be continuously revised with the development of new products. Because of the scope of the system, it can be used in different industries. Aside from the prominent credit card companies, numerous software manufacturers such as Ariba (<http://www.ariba.com>) align their structures with the SPSC.

BMEcat standard for the exchange of product data

XML-based document formats are chosen for the exchange of electronic product data and services. BMEcat is a standard for the transfer of electronic product data drawn up by the German Bundesverband Materialwirtschaft, Einkauf und Logistik (BME). The catalog documents allow for the integration of multimedia product data such as pictures, graphics, technical representations, or video recordings. The header of a catalog document in the BMEcat format is given in Fig. 3.11.

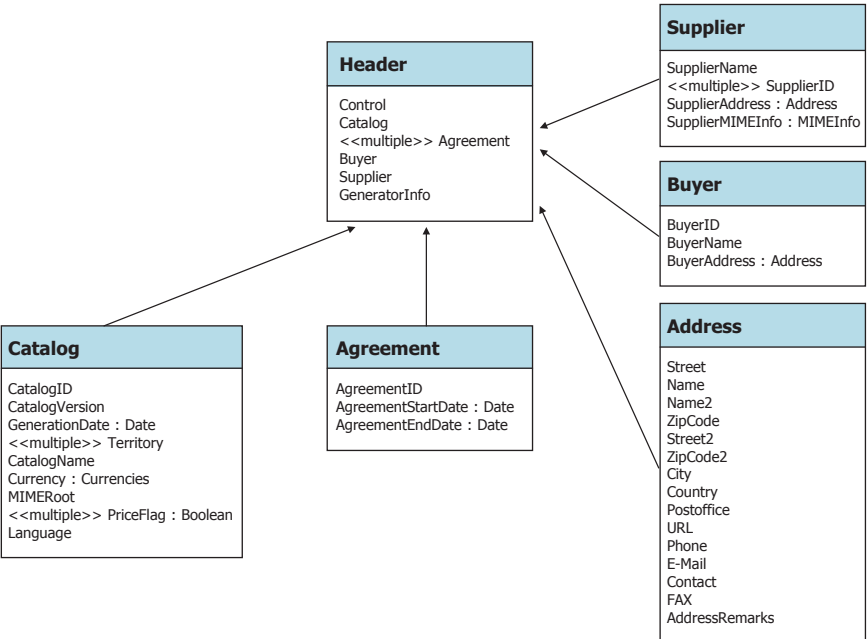


Fig. 3.11: Header of a catalog document in the BMEcat format

Case Study eDVDShop: Use of Electronic Product Catalogs

The eDVDShop has been generating good sales for some time. There are some institutional customers (such as libraries) that also purchase several special DVDs from the eDVDShop. More than 2,500 products are offered, and the institutional customers are for the most part only interested in a small number of these products. Consequently, Anderson considers creating an electronic catalog which will present the products of interest graphically. Apart from this selection of products, each product should get an individual write-up and the valid price of each should be included in the catalog. The valid price is necessary because larger customers of the eDVDShop are granted special discounts. The product catalog should be realized in the form of a PDF (Portable Document Format) file. This format has established itself as a quasistandard on the Web. In this way, Anderson can also dispatch the catalog by email to interested customers.

In a first step, Anderson tests different alternatives for the construction of the catalog. One possibility is offered by the LaTeX typesetting system, which has been used successfully for text production for more than 20 years. This solution has several advantages:

- It is available for free, perfected, and well documented
- A multitude of extensions exist for it; for instance, PDF files can be created along with standard Postscript files
- It can be used for all kinds of documents, such as invoices, offer inquiries, reports and statistics
- Other Web-based applications also draw upon this solution; for instance, the financial accounting system SQL Ledger (<http://www.sql-ledger.com>).

Despite the advantages, Anderson does not decide in favor of LaTeX. The basic reason for this is that LaTeX has no desktop publishing application. Therefore, it is difficult to create visually appealing product catalogs. Moreover, LaTeX must be started as an application external to the web application. This means that in the event of any errors in the production of the PDF files, the system cannot react adequately.

Another alternative which is particularly interesting for the production of PDF files comes from the company PDFlib (<http://www.pdflib.com>). This offers a library for the automatic production of PDF files. The advantage of this solution is that the seller can produce his own drafts and hand these over to the system. The draft is a PDF file which has replacement characters at certain positions. PDFlib offers an Adobe Acrobat plug-in which can be used for the production of the replacement characters. Since the open source version available from PDFlib is relatively limited (e.g., it does not allow for the integration

of drafts as described above), and a commercial version would blow the fixed budget, Anderson makes inquiries about other alternatives.

During these inquiries, Anderson learns about the BMEcat standard, as well as the possibility of producing PDF files from XML documents through a procedure named Formatting Objects (FO), as specified by the World Wide Web Coalition. A combination of both procedures seems sensible to him.

In a first step, the web application produces an XML document (Doc1) in accordance with the BMEcat standard. This document contains all of the necessary catalog data. Furthermore, the solution uses an XSL template which meets the FO standard (Doc2). An FO processor program produces a PDF file from both documents in the second step. One popular FO processor is the FOP derived from the Apache Project, which was developed in Java and is open source. This solution offers a number of advantages:

- The installed webshop eSarine is already largely based on XML documents.
- FOP was developed in Java, like eSarine, and is available under the Apache software license. The fact that both systems are implemented in Java considerably aids the integration of FOP into eSarine, especially in relation to errors arising from potentially defective documents. All of the errors that arise in FOP are displayed by eSarine in the browser. This is especially important for the user who plans to produce his own detailed FO copies in the future.
- The BMEcat standard was developed before the definition of a platform-independent XML-based exchange format. This is why the document Doc1 produced during the creation of the catalog could also be used as an exchange document.
- XSL-FO is not limited to PDF files. It is, for example, also possible to produce HTML pages instead of PDF files with FOP.

*On the cXML
language*

The language Commerce XML (cXML) is open and flexible. It allows electronic business transactions to be carried out for product catalogs. As well as suppliers, products like transaction data can be specified using this language.

*Standardization
with xCBL*

The XML format developed by CommerceOne is known as xCBL (XML Common Business Library, see <http://www.xcbl.org>). This defines product-oriented business data for product catalogs, order entry, invoicing, and settlement.

*Catalog engine
by Inktomi*

A software supplier, Inktomi (<http://www.inktomi.com>), offers a catalog engine which supports the classification of content among other things. It can generate hierarchical or network-like category systems and supply XML documents which contain cross-references like “see also under.” The search engine Yahoo uses catalog software from Inktomi.

3.5 Standard Software for Desktop Purchasing

The problems mentioned above for the procurement of indirect goods and MRO services can be remedied by appropriate information systems—so-called desktop purchasing systems. These systems consolidate the product and service offerings of different suppliers into multisourcing product catalogs. Their browser-based user interfaces support irregular use by employees who, when required, examine offers for the MRO goods and other material individually. Progressive DPSs offer extensive interfaces with operational information systems and ERP systems and guarantee the integration of the procurement of indirect goods into the company's activities. There are currently various providers of software systems for desktop purchasing. Figure 3.12 gives an overview of the variety of functions performed by desktop purchasing systems.

Software requirements for the procurement of MRO goods

The search for potential suppliers is already supported by the DPS. Using so-called reverse marketing, the search for and selection of suppliers is simplified. The point of reverse marketing is that the procuring company, aided by the DPS, publishes site-specific information intended for potential suppliers (guidelines for procurement, quality characteristics, points of agreement, etc.) on the Web, or announces its need for goods, its delivery terms, and its modes of payment. In other words, the company that wishes to buy takes the initiative and performs the marketing.

Objective of reverse marketing

The entire ordering process along with settlement and delivery is also supported by the DPS, as the approval process is initiated by company-specific activity and carried out step by step. The tracking functions are interesting. They

Tracking the ordering process

Desktop Purchasing - Basic Function	Software Support
Sourcing, identification, potential suppliers, settlement	Online inquiry on the Internet, reversed marketing Use of software agents Electronic catalogs Online advertisement and online auctions Direct selection through software system
Ordering process	Support of the ordering process Approval procedure Order transmission by Web browser
Order completion and delivery	Status information on ordering process (supplier side) Online control of the order completion (tracking)
Incoming goods and posting, storage, assessment of suppliers	Automatic posting Electronic complaint management Electronic payment Supplier assessment

Fig. 3.12: Software support through desktop purchasing systems

continually indicate the status of the order with the supplier and the status of the goods in transport on the DPS. Thus, the status of an order is always up-to-date.

Interface to
ERP systems

Incoming goods and postage are handled by the DPS, and (depending upon the depth of integration) are updated directly in the corresponding ERP system. After the commodity has been examined and the date noted, statistics are compiled, and (if necessary) complaints are attended to. This means that the procuring company always has up-to-date information on the quality of the supplier. Typical examples of MRO goods (products and services) are listed in Fig. 3.13.

Products	Services
<ul style="list-style-type: none">• Ppre-configured computer• PDAs and mobile devices• Software• Magazines and newspapers• Books• Office furniture and office equipment• Vehicles• Work clothes and work equipment• Advertising material• Maintenance material• Office supplies• etc.	<ul style="list-style-type: none">• Travel services• Training courses• Advertising services• Consultation and hotline• Financial services• Cafeteria• Copying service• Courier service• Parking lot reservation• Light entertainment programs• Cultural programs• etc.

Fig. 3.13: Service categories for desktop purchasing systems

On the variety
of MRO
products and
services

DPS can greatly relieve the burden placed on the logistics and purchasing departments of companies. Different services, from the workplace layout and office equipment to services for business trips and company socials, can be efficiently procured and supervised via such systems.

Well-known examples of DPSs are those offered by Ariba Technologies, Inc. and the CommerceOne Corporation:

The desktop
purchasing
system from
Ariba

Ariba Operating Resources Management System. A DPS with a user-friendly (Java-based) front end is offered by the company Ariba Technologies, Inc. The system contains an efficient search engine that allows the product groups desired to be specified by means of selectable criteria. The individual work procedures involved in procurement are supported by a workflow component. Providers of product catalogs must supply their specifications in CIF format (Catalog Interchange Format) so that the data can be aggregated into a multisupplier catalog.

The
eProcurement
solution from
CommerceOne

BuySite by CommerceOne. The company CommerceOne sells an eProcurement solution under the name BuySite. This platform supports the procurement of MRO goods, settlement with the issuance of an invoice, and process control.

Apart from offering independent DPSs, the manufacturers of ERP systems have begun to extend their product ranges with functions for the procurement of direct and indirect goods (see for example SAP Enterprise Buyer Professional).

3.6 Market for eProcurement Service Provider

An eProcurement service provider specializes in the procurement processes of companies and mediates different supplier relationships.

The basic structure of an eProcurement service provider is shown schematically in Fig. 3.14. The most important components concern the ordering service, the catalog service, and system administration. In the request and ordering services, the requirements of the procurement as well as the approval rules for each procurement company are established and recorded. The ordering itself is supported by software, as both settlement and payment arrangements are recorded.

Request and ordering services

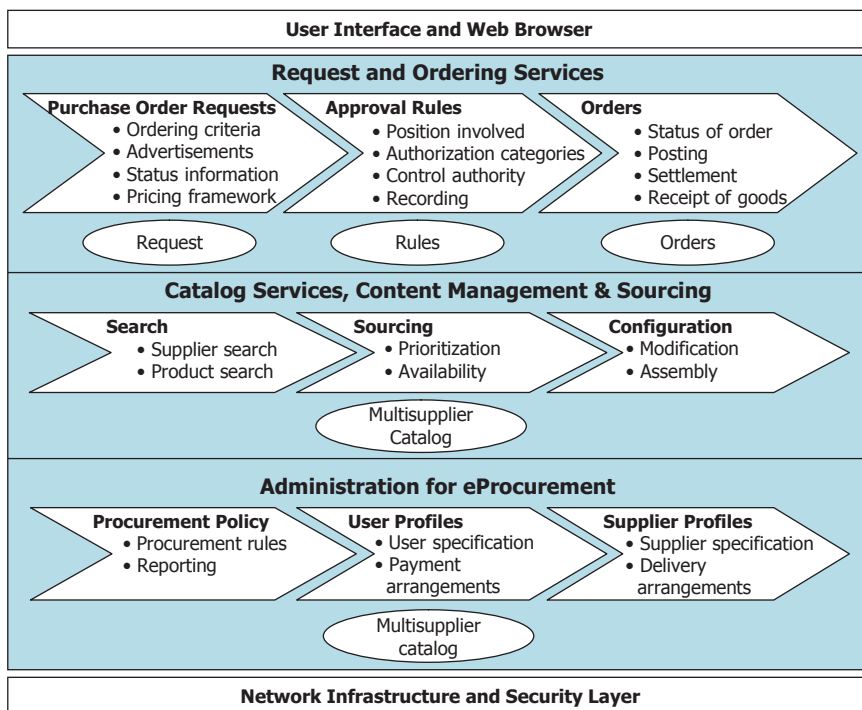


Fig. 3.14: eProcurement service provider (according to Dolmetsch)

The catalog service and content management enable suppliers, products, and services to be searched for. At the same time, a multisupplier catalog must be put together and maintained. Some eProcurement service providers offer the possibility of configuring complex goods and product groups.

Configuration of complex goods

System administration involves recording and maintaining user profiles and supplier profiles. When desktop purchasing systems and eProcurement service providers are used, the following savings are made possible:

Procurement process. This is automated to a large extent and is therefore less error-prone. The status of an individual order can be queried at any time. Quality characteristics and procurement times can be evaluated periodically.

Stock. According to agreements with the suppliers, stock can be kept small or reduced to zero. Employees can see current order quantities and delivery data.

Price advantages. When a procurement policy is derived, quantity discounts and price terms can be negotiated. In addition, the purchase order volume can be bundled, which in turn leads to price advantages.

Control. During and after the procurement process, evaluations of the appropriate databases can be performed at any time. This provides a good basis for making decisions that involve adapting the procurement and pricing policies if necessary.

Due to the advantages of eProcurement, more and more companies and public institutions are stocking up with appropriate DPSs or demanding the services of an eProcurement service provider.

3.7 Literary References

eProcurement literature

The dissertation by Dolmetsch [Dol00] gives an overview of the topic of eProcurement. This work is distinguished by concrete applications, functionalities, and aspects of architecture from other investigations. The emphasis is on desktop purchasing systems (buy side). The article by Saarinen and Vepsäläinen [Saa94] shows a framework of different eProcurement strategies that help managers to optimize their supplies. The work by Schubert et al. [Sch02] deals with different case studies (based on experience) that illustrate the market models for eProcurement (sell-side, buy-side, and marketplace models).

Documents that describe the SPSC can be found on the associated web site (<http://www.unspsc.org>). The BMEcat standard discussed earlier also has a web site that provides further information (<http://www.bmecat.org>). Current research in the area of eProcurement is focusing on the introduction of new technologies like RFID [Wam06] or mobile devices [Geb03], as well as improvements to supplier relationship management [Hou04, Gro07]. Baron et al. [Bar00] examine eCatalog issues from the business buyer's viewpoint. In the book by Turban et al. [Tur06], procurement methods are listed and discussed. In addition, desktop purchasing systems and reverse auctions are described.